

these I have had for more than ten years. It must be thirteen years old, from my observation of the rate of growing. At three years old it was, according to the received descriptions, "*subglobose*," &c. But with its growth, it has altogether lost this character. And, while the flowers are identical in general characters with those of the *Cereus*,—very much more identical in detail with many species of the *Cereus* than those of different received species of *Cereus* are with one another,—it is quite impossible to separate the plant itself, in its general habit, from any characters taken from a general survey of the *Cereus*. The plant in question stands beside a specimen of *Cereus* whose flower that of the *Echinocactus* very nearly resembles, and which is remarkably full-grown and stout. Both plants grow tall and straight. Both have deep straight ribs. And, in both, the tubercles are arranged, with reference to one another on the adjoining ribs, in a regular figure, the quincuncial,—a matter which will, I think, be remarked in all the numerously ribbed species of *Cereus*, and a similar *character* of regular relative arrangement in those which have only three or four ribs. The *Echinocactus* is now nearly a foot high. It has continually, and regularly, grown in height, but does not get any broader.

I could enlarge on some other points of character; but this letter has already become longer than I intended. I will only add, that young plants sometimes run into the long thin form of so many of the *Cereus*. I have had young shoots of *Echinocactus* which could not be distinguished from young shoots of even *Cereus flagelliformis*;—which will be admitted to be about as extreme a comparison as could be made.

Thinking that any observations which can tend to the elucidation, or *fixation* (if I may say so), of the important and interesting question of *What is a Genus?* cannot be wholly useless, I place the above very much at your service.

I am, my dear Sir, very truly yours,

W. Francis, Ph.D.

J. TOULMIN SMITH.

CAUSE OF THE POTATO DISEASE.

The precise cause of the potato disease is still unknown; but we are able at least to eliminate certain presumed causes, and to prove where the disease begins, and how it reaches the tubers. It is pretty generally admitted at present that the parts of the plant exposed to the air are first attacked, and that their diseased state precedes that of the tubers, and probably causes it. The following is a rather curious proof that such is the case. M. de Gheldere of Thourout in Belgium grafted some tobacco plants upon potatoes, according to Tschudy's method. Success was probable, as the *Nicotiana* and *Solanum* belong to the same family. The grafts did not merely take, a fact of itself very interesting, but the plants happening to be in a field of potatoes entirely attacked by the disease, the grafted stocks alone remained exempt. If the tubers were sound in this case, it can only be attributed to the presence of the leaves of tobacco not liable to the disease, instead of leaves of the potato itself. The fact

is recorded in M. Ch. Morren's Report on the Exhibition of the products of Belgian agriculture and horticulture, 1847.—*Bibliothèque Universelle*, Feb. 1850.

On the Nature of the Gregarinæ. By Dr. F. STEIN.

The author has raised the number of species of insects in which *Gregarinæ* occur to 68. Previously it was known only of 29. With the addition of the Myriapoda, Crustacea and Annelides (the *Lumbrici* contain some in their male organs; Henle), the number amounts to 80. They are for the majority voracious and carnivorous animals; at all events they never feed upon fresh vegetable matter. This distribution of the *Gregarinæ* in species whose kind of life is so exclusive evidently proves that their germs are introduced with the food.

The body of the *Gregarinæ* is an ovoid, fusiform or cylindrical sac, everywhere closed, without any trace of mouth or anus. In some species the body is simple, but most frequently it is separated into two parts. The anterior portion forms a hemispherical or conical segment, separated from the remainder by a strangulation. A vertical septum corresponds to this constriction, and thus divides the interior cavity into two portions. This septum had not been previously observed. In other species the body is divided into three cavities by two strangulations and two corresponding internal septa.

In accordance with these differences of organization, the author separates the *Gregarinæ* into three natural families:—

1. The *Monocystideæ* or simple *Gregarinæ*, without strangulation and without internal septum.
2. The *Gregarinariææ*, or ordinary *Gregarinæ* with the body divided into two parts.
3. The *Didimophydeæ*, or *Gregarinæ* whose body is divided into three portions, as if it resulted from the adhesion of two individuals, one from each of the preceding families.

The envelope of the *Gregarinæ* consists of a hyaline, transparent, smooth and elastic membrane. Sometimes the outer surface is prolonged into immoveable filaments or into vibratile cilia (Henle found the latter to be the case in the *Gregarinæ* from the *Lumbrici*). The interior presents not a trace of organization; it is filled with a liquid, probably albuminous, in which a considerable number of globules float, which the author considers to be globules of fat. The young individuals contain a less number, and are consequently more transparent. Dr. Stein confirms the presence of a nucleus placed freely in the contents of the *Gregarinæ*. It is always simple in the *Monocystideæ* and the *Gregarinariææ*; one species of the third family exhibited two, another contained but one. Although the reproduction of these singular organisms is still quite obscure, several facts appear to throw some light upon the subject. One of the most important is the following observation of Von Siebold.

The thin intestines of a dipterous larva (*Sciara nitidicollis*) contain, along with numerous *Gregarinæ* (*G. caudata*), a large number of round vesicles filled with innumerable minute bodies of a turnip shape, called *Navicellæ* by Von Siebold. They are composed of a soft nucleus, and of a hard and transparent envelope. Henle again